Land Condition Trend Analysis (LCTA) is one of the four components of the Integrated Training Area Management (ITAM) program. The ITAM program is a Forces Command (FORSCOM) supported program housed in DPTMS - Range Control. Land Condition Trend Analysis is a repository of scientific data on the natural resources of Fort Lewis. LCTA collects physical and biological resources data from training lands and ranges in order to relate land conditions to training activities. LCTA incorporates this data into a relational database that can be queried for specific variables that are to be studied. This data is intended to provide information to proactively manage land use and natural resources.

The LCTA II objectives, under direction of HQs DA and FORSCOM, steer the Fort Lewis LCTA Workplan:

- Provide information that may affect force structuring and stationing at MACOM and DA levels.
- Provide current and predictive resource information that assists in training and testing activities.
- Identify impacts on resources by trainers, testers, and non-military land users.
- Identify and prioritize resource restoration, rehabilitation, and revegetation areas to ensure sustainable training and testing.

LCTA analyzes the condition of plant, bird, and small mammal populations and densities. The data is always collected within the Fort Lewis boundaries and can be used to measure the affects of training, nonmilitary use, and land management techniques. The "Impacts of the M1A1 Tank in Grassland Communities on Fort Lewis" is a project that directly benefits the heavy units that are stationed at Fort Lewis. The information from this project will be extremely helpful in determining the amount and the time of year that training that should take place without converting the grassland into a mudland.

The LCTA program was implemented to inventory and monitor Army natural resources. The major data collection efforts during the 1998 field season were put towards monitoring 161 special use vegetation plots, surveying 65 bird plots, surveying 40 small mammal plots, and completing land condition mapping of training area 14 and Lower Weir prairie. The information is available to all units and agencies on the Installation. LCTA collects ecological data and delivers the results to Range Division. Range Division uses this information to assist units in choosing the best training area for given training scenarios. LCTA is unlike any other program on Fort Lewis in that it is a comprehensive data collection method that monitors the trends of flora and fauna in the training lands to provide information for maintaining the highest quality training realism for the Army's soldiers.

Each field technician was responsible for a priority component of the 1998 LCTA Workplan. These responsibilities included organizing the fieldwork and writing up the final "report of findings." **Enclosed is the collection of the report of findings for the 1998 season.**

The field crew is the ears and eyes for the LCTA program. They are in the field every day observing what is going on and how activities are affecting the habitat. This information is relayed to the LCTA Coordinator and then passes to appropriate decision-makers. The crew has extensive knowledge of the installation and its habitats. They also have high caliber knowledge of the flora and fauna on Fort Lewis. They are thoroughly trained in the methods and use of all of the LCTA field equipment.

LCTA also provides support and information to the other components of the ITAM program and Range Control. The LCTA research data assists the Land Rehabilitation and Maintenance (LRAM) in measuring the effects of land rehabilitation techniques. The natural resource data provides information to the Environmental Awareness (EA) program to produce Fort Lewis informational tools to prevent unnecessary damage to the training lands. LCTA provides scientific comments and recommendations to Range Control on plans that units submit for a training exercise. The field crew also provides detailed spot reports of illegal dumping and other activities in training areas, both authorized and questionable, to Range Control.

The ITAM program was highlighted in a couple of publications this field season. The "Northwest Guardian" had an article in the 13 November 1998 issue that focused on what all the components of the ITAM program are doing to support the training mission. There was also an article written by the LCTA Coordinator in the national ITAM newsletter, "The Bridge" Spring 1998, describing the importance of land managers getting in the field with the military to learn from about their training objectives so that we can better support the mission. The LCTA program also assists in making sure that other natural resource agencies know that the Army is committed to land stewardship and that the ultimate goal is to train the soldier while maintaining the integrity of the training lands.

The 1998 field season had an exceptionally high amount of safety issues for the field crews, especially in the Rainier Training Area. There were two noted interactions with the general public that compromised the crew's safety. All illegal or harmful activities are immediately relayed to Range Control and in some instances to the Military Police. A request from the Deputy Garrison Commander has been instituted to find solutions to improving the safety of personnel in the field.

The work presented in this document is the result of professional, hard working personnel. If you have any comments or suggestions for improvement please contact Angela Lombardi, LCTA Coordinator at 967-1550.

Acknowledgments

The LCTA program would like to thank the following people for their comments and support of the work completed during the 1998 field season.

Charlie Askins	ENRD – Forestry
Scott Ballentine	Northwest Adventure Center
Perry Beale	Thurston County Noxious Weed Control
Ken Cadwell	ENRD – Fish & Wildlife
Sgt. Carpenter	27th Ordnance Company – Fort Lewis
Dave Clouse	ENRD – Fish & Wildlife
Birdie Davenport	DNR Natural Areas Preserve
SGT Dejarlar	HHC 1/32 AR
PVT Finnagen	HHC 1/32 AR
John Fleckinstein	Washington Natural Heritage Program
MSG Flitter	Range Control Master Gunner Light
Jeff Foster	ENRD-Forestry Branch
Teresa Hansen	PW-GIS
Col.Hertling	3rd Brigade
Patricia Johnson	The Evergreen State College Intern
Dave Jones	CEMML
Virginia Lanoue	Range Control Systems Administrator
Del Larson	Range Control Scheduling
PVT Lee	HHC 1/32 AR
LRAM Crew	ITAM/LRAM Program
Col. Patterson	DPTMS
Marlyn Peavler	ENRD-GIS
Ann Potter	Washington State Fish and Wildlife
Lisa Randolph	LRAM Coordinator
Jim Rhodde	ENRD – Forestry
SFC Richter	Range Control Safety Officer
Brandy Ritchie	ENRD-GIS
Tracy Rush	Washington Natural Heritage Program
Inger Schmidt	ITAM Coordinator
Dave Thysell	Pacific NW Research Station
PFC Votruba	HHC 1/32 AR
MSG Waymire	Range Control Master Gunner Heavy
John Weller	Range Officer

The LCTA crew completed an introduction to unexploited ordinance class, map reading class, Global positioning systems training, and utilized the Stone education center's computer facilities.

Land Condition Trend Analysis
1998 Workplan

Prepared by Angela Lombardi, LCTA Coordinator

The overall goal for the 1998 season is to continue to monitor Fort Lewis high use training areas and areas of ecological importance. LCTA will also strive to fulfill the LCTA II requirement of providing current and predictive resource information that assists in training activities. At the end of the season all priorities will be written up in a "report of findings" by the lead field technician of the priority.

Priority #1 Vegetation Surveys
The following areas will be surveyed during the 1998 field season. The established LCTA methods will be used with the addition of quantitative military disturbance measurements. Spend more time identifying mosses and lichens to be able to use this data in determine if these vascular species play an important role in the prairie habitat for restoration purposes. All the data collected from the surveys will be added to the LCTA relational database for analysis. (172 total plots)

- **13th Division Special Use Plots** All 13th Division special use plots will be monitored. (45 plots)
- **Training Area 6 and 18 Plots** All LCTA special use plots in TA's 6 and 18 will be monitored due to its high tracked vehicle use. (22 plots)
- **Mortar Point 10** In continuation with the restoration project that was started in 1996, the ten special use plots will be monitored. The information from these plots will contribute to a better understanding of intensive restoration projects. (10 plots)
- **Johnson Prairie Special Use Plots** All Johnson Prairie special use plots will be monitored in accordance with the 2 year rotation. (16 plots)
- **Lower Weir Prairie Special Use Plots** All Lower Weir special use plots will be monitored to assist in determining a natural rate of change that could be used for data analysis. (31 plots)
- **Upper Weir Prairie Special Use Plots** All Upper Weir special use plots will be monitored in accordance with the 2 year rotation. (39 plots)
- **Oak Woodland Plots** In conjunction with LRAM Oak (*Quercus garryana*) habitat restoration efforts, LCTA will monitor the oak woodland special use plots. A progress report will be submitted to the LRAM Coordinator for her reports. (9 plots)

Priority #2 Bird Surveys
Bird surveys will be conducted during the 1998-breeding season. This will be the second year of data collection methods that specifically look at the relationship between bird populations and military disturbance. The surveys will be conducted by two of the LCTA field technicians. A winter bird count will be performed in November to identify resident species.

Priority #3 Land Condition Mapping
Finish land condition mapping on Lower Weir prairie initiated during the 1997 field season. Begin vegetative mapping for 13th division prairie since this site has the most tracked vehicle use. The mapping will assist in knowing the hot spots for LRAM, the high activity areas for training, and the potential seed source sites for the prairie. In conjunction with the mapping, a species list will be associated with the percent covers so that a map can relay more information to the natural resource manager.

Priority #4 Butterfly Surveys
Continue monitoring butterfly species on the existing two transects in El Guettar and east Training Area 15. Survey known population of the Mardon Skipper (*Polites mardona*) within the southern part of the Artillary Impact Area. Begin general surveys of other prairies to determine if they would be appropriate for surveys. Coordinate with Fish and Wildlife so that efforts are not duplicated.

Priority #5 Tracked Vehicle Impacts Study
Fort Lewis ITAM and CEMML will determine specific methods and sites for this cooperative project. The LCTA field technicians will perform the vegetation inventory of the research plots.

Priority #6 *Aster curtus* Demographics Study
Assist the University of Washington personnel monitor their existing *Aster curtus* research plots.

Priority #7 Review Seibert Stake Locations
Review the Siebert stake sites that are not a part of the Cultural Resources inventory, to verify the validity of the sites. At each site, species composition and density will be recorded.

Priority #8 Fort Lewis LCTA Methodologies Handbook
The handbook will be continued, from the 1997 season, to include a review and field test of the vegetation and bird methods. A more extensive section will be created on the analysis of the data.

Priority #9 Seed Collection
In coordination with the LRAM coordinator, LCTA will continue to collect seeds to be used for LRAM restoration projects. Collected seeds will be properly labeled and stored for future use.

Priority #10 Noxious Weeds Monitoring
Continue to monitor the known noxious weed populations within the training areas and along the section of the Nisqually River that flows through Fort Lewis's boundaries. A GPS point or UTM coordinate and plant density measurement will be assigned to each location. The report of findings will be disseminated to Fort Lewis' noxious weed coordinator and the Pierce and Thurston Counties noxious weed board.

Priority #11 Threatened, Endangered, or Sensitive Species of Washington State
Continue monitoring the known populations of *Trillium parviflorum, Carex comosa, Carex interupta, Pityopus californica,* and *Aster curtus*. No new surveys will be performed this season. Assist with monitoring *Howellia aquatilis* populations for the cooperative project between Washington Natural Heritage Program, Fort Lewis Fish and Wildlife, and the ITAM program.

Priority #12 Spot Reports
All trash or other "dump" items will be reported to the Range Control personnel for proper disposal procedures. The spot reports will include details of the trash and directions to the site accompanied with the UTMs.

Assist the Forestry Branch
In exchange for data analysis and project development support, the crew assisted the Forestry Branch with vegetation surveys in the Ponderosa Pine research plots.

Assist with the ITAM Conference
Assist with the registration of participants of the 7th annual ITAM conference in Yakima, Washington in exchange for free registration to the conference and a trip throughout the Yakima Training Center.

Summary Report on LCTA Special Use Vegetation Surveys Conducted on Fort Lewis, 1998

Written by Erika Ressa

ABSTRACT:

In the 1998 field season the LCTA crew (M. Clegg, R. Gilbert, M. Remsberg, and E. Ressa) surveyed 161 Special Use Plots. The plots are widely dispersed throughout Fort Lewis including 13th Division Prairie (TA 14 & 15), Marion Prairie (TA 18), Johnson Prairie (TA 22), Lower, Upper (TA 21) and South (23) Weir Prairies, Oak woodlands, Mortar Point 10, and Ranges 50 and 51. Ranges 74 and 79 plots (#742, #743, #745) and Point Salines plots (#329 and #330) were not surveyed in 1998. All requirements established by the LCTA Coordinator (A. Lombardi) for data collection were met.

The LCTA 1998 Bird Report
Fort Lewis, WA

Written by Michael Clegg

ABSTRACT

The Land Condition Trend Analysis (LCTA) program began monitoring birds on Fort Lewis in 1992 using the modified point count transect technique. This technique, designed by Pazik for the LCTA program, was used through the 96' field season to compile a species inventory of the birds on Fort Lewis (Pazik, 1992). In 1997, with the inventory complete, the LCTA Bird Monitoring Program decided to establish a series of long-term study plots to address its research objective: To determine the effects, if any, that military training has on birds. In preparation for this project, the current literature was reviewed to find the most appropriate methods for researching the effects of land use impacts on birds in the Pacific Northwest. After having considered various methods for monitoring birds, including the established LCTA method, the Program decided to implement the point count technique. The point count technique was chosen because it is the most time efficient, widely used and effective survey method for measuring populations of small forest birds in the Douglas-fir forests of the Pacific Northwest (Carey, 1991). Furthermore, point counts are also valuable for measuring land use impacts because they focus on songbird breeding activity. Songbirds are highly effective indicators of ecosystem health due to their vocal nature and the ease with which they can be detected (Hutto, 1996). This is especially true in the breeding season when male songbirds vocalize conspicuous songs in an effort to define and/or defend their nesting territory. As such, point counts are conducted in the spring when songbirds stay localized within their breeding habitats and vocalize easily detected songs.

During the '97 field season, the LCTA Program established and surveyed 59 bird plots according to the point count technique described by Carey (1993) and Ralph (1991). These plots are distributed in Douglas–fir forests and Oak woodlands across Fort Lewis. The program selected Oak woodlands and Douglas-fir forests as study habitats because of the high diversity of songbirds and military training activities that commonly occur in these two ecosystems. Within each of these two habitats, undisturbed plots were established to gather baseline habitat information and obvious training use plots of various types (e.g., bivouacking, tracked vehicles, artillery fire, etc.) were selected to compare with them. During the 1998 field season, 6 new plots were established, making a total of 65 bird plots surveyed. The six new plots were added to achieve a statistically valid set of ten minimal training use plots for each of the two habitat types.

Land Condition Assessment Mapping
On Fort Lewis' Prairies

Written by Mari Remsberg

Abstract

As a means to help in the integration of the Army's military training mission, natural resource stewardship, and environmental compliance, The Land Condition Trend Analysis (LCTA) program continued to assess vegetative quality of Fort Lewis' prairies using land condition mapping methodologies established in 1997. Our goal for the 1998 field season was to finish mapping Lower Weir and 13th Division prairies. These maps, particularly the one on 13th Division prairie could be utilized by military trainers to help make decisions regarding ideal places to train. Most of our time was spent mapping 13th Division, which is heavily impacted on a regular basis by tracked vehicle training. Using Global Positioning System (GPS), the prairie was divided into twenty-five meter square polygons delineated by UTM coordinates. Data was collected in each polygon on the following attributes: 1) percentage of Idaho fescue (*Festuca idahoensis*) in relation to non-native grasses, 2) Scot's broom (*Cytisus scoparius*) percent cover and height, and 3) the presence/absence of white-topped aster (*Aster curtus*). Thirteenth Division prairie additionally had the following attributes surveyed: 1) percent of tracked vehicle disturbance, and 2) presence of Oregon white oak and ponderosa pine. What resulted from this data collection is a set of maps for each prairie that aid in the understanding of overall prairie quality. These maps are a valuable tool in aiding decisions regarding ideal locations for high impact military training, or areas where native prairie conditions no longer exist. These methods have proven for the second field season in a row to be time efficient and repeatable in the field with the potential to track long term effects of military training.

Summary Report of LCTA Butterfly Surveys conducted on
Fort Lewis, WA
April – August, 1998

Written by Mari Remsberg

ABSTRACT

A total of 16 butterfly surveys were conducted at two different prairie sites on Fort Lewis by the Land Condition Trend Analysis (LCTA) crew to determine relative abundance of butterfly species. Surveys conducted this year followed the same methodologies as established in 1997.

Impacts of the M1A1 Abrams Tank on Vegetation and Soil Characteristics of a Grassland Ecosystem at Fort Lewis, Washington

1998 Field Report

Written by
Erika Ressa, Engineering and Environment, Inc. and
Angel Lombardi, Environmental Restoration Company

Abstract

"Impacts of the M1A1 Abrams Tank on Vegetation and Soil Characteristics of a Grassland Ecosystem at Fort Lewis, Washington" implementation plan was prepared by Dave Jones, from the Center of Ecological Management of Military Lands, through a contract with ITAM. The Impacts study, from here forward referred to as the Impacts Project, is designed to assess the effects of the M1A1 Abrams Tank use on soils and vegetation of the grassland, or prairie, communities. Through a cooperative effort with LCTA, CEMML, and 3rd Brigade this project will be complete in 2002. The 1998 field season was the first year for implementing the project.

Aster curtus Demographic Analysis Study
Fort Lewis, Washington

Written by Rod Gilbert

Abstract

During 1997, a study to provide a better understanding of the population biology of white-topped aster, a regional endemic species, was initiated between the Nature Conservancy, the Department of Zoology, University of Washington and Fort Lewis: A Demographic Analysis of the Impact of Army Disturbances on *Aster curtus* Population Viability. The research goal is to provide a better understanding of how physical disturbance (tracked and wheeled vehicles) impacts the establishment, survival, growth and reproduction of white-topped aster in different conditions, and to identify land management options in order to maintain viable populations on Fort Lewis. Twenty LCTA plots were used as study sites, containing 335 patches of white-topped aster, from which demographic data were collected. In addition 6 germination plots for each of the demographic plots were established to determine seed germination rates under different growing conditions. During 1998 all plots were resurveyed. The LCTA crew collected demographic data from 8 of the 20 established plots, and will collect data from all 20 plots during 1999.

LCTA SEED DISPERSAL PROJECT

Fort Lewis, WA. 1998

Written by Erika Ressa

ABSTRACT:

Due to the prioritizing of projects in the 1998 field season, the LCTA crew did not get a chance to collect any seed. Seed collected during the 1997 field season was stored in a refrigerator and broadcast at the Impacts of the M1A1 project site for restoration purposes. The LCTA crew decided the Impacts site would provide opportunity to use seeds saved from 1997.

The Impacts of the M1A1 project site is located near Mortar Point 1 at the northwestern corner of the Artillery Impact Area (AIA). The Impacts of the M1A1 project required tank disturbance in order to gain an understanding of the effects on vegetation in a pristine prairie environment in relation to its ability to sustain tank training. For more details refer to the 1998 Impacts of the M1A1 project field report. The Impacts project caused excessive damage outside of the study plots, so there were large areas of exposed soil. This site was chosen by the crew to disperse the saved seeds.

Noxious Weed Report
Land Condition Trend Analysis Program
Fort Lewis, Washington

Written by: Rod Gilbert

Abstract

Every year the County Noxious Weed Control Board publishes a list of noxious weeds that they target for eradication. The list is typically divided into two sections, Class A and Class B. Control of taxa on both lists is mandatory. The difference between the two lists is the degree of control that is required. Total eradication is desired for Class A weeds, where as containment and control is permitted for Class B. The weeds on both lists are *highly* invasive, or poisonous to humans or livestock, and are capable of dominating their immediate environment. Some weeds on the list pose serious economic threats to farmers and businesses. Others pose threats that are more difficult to evaluate economically. Loss or alteration of native habitat to non-native weeds is one of the most serious threats to the native flora, and the fauna that depends upon it. Well-known weeds such as Scot's broom and reed canarygrass are ubiquitous now in Western Washington, yet neither makes it onto the A or B list. Emphasis on management and control is given to weeds that are still considered containable, but have the potential to become the new 'Scot's broom'.

Threatened, Endangered and Sensitive Plant Report
Land Condition Trend Analysis Program
Fort Lewis, Washington

Written by: Rod Gilbert

Abstract

During the coarse of the 1998 field season, the LCTA crew conducted and participated in several rare plant surveys. There are currently 5 species listed as either Threatened, Endangered or Sensitive by the Washington Natural Heritage Program (WNHP) that occur on Fort Lewis. The crew spent one day searching for pine-foot (*Pityopus californicus*) and a rare, (but not listed) phantom-orchid (*Eburophyton austiniae*) both of which were found on the Fort within the last two years. A survey of Sequalitchew Marsh for bristly sedge (*Carex comosa*) also revealed no new significant populations. The LCTA crew also surveyed white-topped aster plots, which is part of the on-going *Demographic Analysis of the Impact of Army Disturbance on Aster Curtus Population Viability* study, that were established by Dave Bigger and the Nature Conservancy in 1997. In addition to the Demographic Study, the crew also collected occurrence data for white-topped aster as part of the Land Condition Mapping Project on 13th Div. Prairie, and surveyed plots for the Impacts of the M1A1 project on Mortar Point 1. The crew discovered one new water Howellia (*Howellia aquatilis*) population during the field season on the edge of 13th Div. Prairie. This new occurrence was surveyed, and the data forwarded to the WNHP. WNHP staff established permanent survey markers, and surveyed all 17 wetlands where this taxa is found. These markers were GPS'd by the crew during 1998. Future surveys for this federally listed species will be conducted by the LCTA crew. There were no new surveys for small flowered Trillium, (*Trillium parviflorum*), Canadian St. John's wort (*Hypericum majus*) or Puget balsomroot (*Balsamorhiza deltoidia*).

1998 SMALL MAMMAL SURVEY REPORT FOR THE LCTA PROGRAM ON FORT LEWIS, WA

BARBARA WOOD, CONTRACTOR
COLORADO STATE UNIVERSITY

ABTRACT:

A small mammal survey of Fort Lewis, WA was conducted between 18 August 1998 and 26 October 1998. A total of forty-three Land Condition Trend Analysis (LCTA) vegetation plots established on Fort Lewis were surveyed with Sherman live animal traps. On eight of the forty-three plots, no small mammals were collected. The 1998 small mammal survey was confined to LCTA plots located within prairie habitat where military disturbance varies for light (foot) to severe (tracked vehicles). A total of 381 small mammals (including 128 recaptures) were captured representing *Peromyscus* sp. (mice), *Sorex* sp. (shrews), and *Microtus* sp. (voles). One short-tailed weasel and one starling were also captured on Marion prairie. Plots surveyed were representative of the varying military and natural disturbance regimes.